Identifying Opportunities in Distributed Generation

Contract #: 500-00-022 **Project #:** 7
Contractor: Gas Technology Institute
Subcontractors: Primen
Project Amount: $75,000
Match Amount: $1,311,700
Contractor Project Manager: John Kelly (847) 768-0665
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Status: Completed

Project description:
This Fund provides sponsors with the opportunity to gain familiarity with small-scale generation technologies that are still emerging such as microturbines, fuel cells, energy storage technologies, energy recovery, or web-based dispatch and control technology. Further research, though secondary in focus, will examine already existing internal combustion (IC) engines, and traditional small gas turbine technology. By joining with the other investors in this Fund, investors share the costs and obtain the information at a fraction of the costs that would be incurred if done independently. In addition, investors are offered a cost-effective, low-risk environment in which to explore new business opportunities from information and products developed. All investors further save by leveraging previous GTI investments and research.
The major activities under this project are:

1. Business Opportunities in Aggregating Distributed Generation.
2. Pilot Project Demonstration for Web-based Aggregation and Control System.
3. DG Interactive Guidebook on CD-ROM.
4. Microturbine Performance Assessment Program.
5. Field Demonstration of Combined Microturbine & Desiccant Dehumidification (cogeneration).
6. Under-5-MW internal combustion (IC) Engine case history study – U.S. Sites.

This project supports the PIER objectives of:

- Higher quality, more reliable power.
- Addressing barriers to deployment of distributed generation and renewables.

Proposed outcomes:
The following outcomes and deliverables are anticipated:

1. Field evaluations and technology and test reports of proton exchange membrane (PEM) fuel cells and pre-commercial Ingersoll-Rand microturbines (several fuel cell sites and at least one microturbine site in an anchor investor territory.
2. Market research (Delphi) studies for small fuel cells and microturbines.
3. Business and technology assessments for the top-20 solid oxide fuel cell (SOFC) and PEM fuel cell manufacturers.
4. One-half day workshop at investor site to discuss results of the fuel cell study.
5. PowerPoint presentation summarizing fuel cell study results on CD-ROM.
6. Business and technology assessments for top microturbine manufacturers.
7. PowerPoint presentation summarizing major microturbine study findings.

Actual Outcomes:

1. FCT Solid Oxide Fuel Cell (SOFC) Fuel Cell Field Demonstration.
   - GTI worked with, and supported, the host utility, Memphis Light, Gas & Water (MLGW), to promote the project to the Memphis Botanic Garden (MBG). The MBG has agreed to host the FCT SOFC to power a greenhouse(s) on their grounds.
   - MLGW personnel have worked with MBG personnel to gather preliminary site related information. This information has been discussed with the project team, which consists of representatives from the following organizations.
     - Fuel Cell Technologies, Inc. (Fuel Cell Manufacturer).
     - Gas Technology Institute (Project/Technical Management).
     - MBG (Host Site).
     - MLGW (DGMF Host Utility Representing municipals).
   - A tentative site within the grounds of the MBG has been selected. Specifically, the fuel cell will power the Conservatory Classroom greenhouse and possibly the Volunteer Greenhouse. Some pictures are shown below for reference. Conservatory Classroom.
   - Several potential sites near the Conservatory Classroom Greenhouse and the Volunteer Greenhouse have been discussed. A final location will be selected after a site visit is conducted and additional information is analyzed.
   - GTI, on behalf of the DGMF members, reached agreement with FCT on December 30, 2002 for the actual purchase of the fuel cell system and other related items such as training, shipping, warranty, and start-up services.
   - GTI has prepared and issued for review and comment a “Draft” Host Site Agreement.
2. Proton Exchange Membrane (PEM) Fuel Cell Field Demonstration.
   - GTI prepared and issued a bid package to four SOFC manufacturers. Some interest was expressed verbally, however, no written proposals were received.
   - GTI prepared and submitted to Questar a contingency plan for the fuel cell demonstration project to be done in their service area. This plan will be implemented starting in the first quarter of 2003. Essentially, this plan consists of procuring a Plug Power 5 kW PEM fuel cell and working with Questar to find an application for it.
3. DG Web Advisor.
   - GTI continues to populate the DG web site with pertinent documents and information, such as quarterly reports, meeting and teleconference minutes and others.
   - The links section has been fully populated with a variety of web sites related to the distributed energy area. A news/resources section was added with a variety of good information sources.
   - The remote monitoring web site was updated with more technical information about the equipment.
   - GTI has fine tuned access to the HealthSouth remote monitoring site for the IR microturbine test currently taking place. This data can be accessed through the 2001 DGMF web site.
   - GTI is working with the Plug Power demonstration project team to get remote monitoring capabilities installed at the Challenger Learning Center.
   - Customized reports and graphs of past data, as well as access to real live data from the IR demonstration are now available.
4. Microturbine (MT) Performance Testing Program.
   - The Capstone Performance Test Report was issued in January, 2002.
   - GTI installed and tested the Ingersoll Rand 70 kW microturbine. Several specified tests were conducted and the data recorded for further analysis. Results presented to investors.
   - GTI completed the start up of the new Distributed Energy Test Center in Des Plaines, Illinois. The Turbec unit was installed and tested in the new lab.

• A variety of tests were performed on the Turbec unit. GTI is working on the final report summarizing the results of these tests and the overall performance of the Turbec microturbine. This final report is scheduled to be distributed to fund members in January, 2003. Overall, the Turbec unit worked very well.
• GTI has received the Capstone 60 kW microturbine and intends to install and test this unit, in GTI's new lab, during the first quarter of 2003.
• An agreement was made that the DGMF Microturbine Project will provide cofunding for the testing of the Bowman 80 kW microturbine.

5. DG Strategic Service. DG Interactive Guidebook is now on CD-ROM.
   • The following information was issued by Primen:
     - Distributed Energy Updates #31 through #34.
     - Primen Perspective #12: "Absorption Chillers and DE: Combo With Potential."
     - Primen Perspective #13: "Distributed Asset Management: Can DE Deliver?"
     - Primen Perspective #14: "Stationary Fuel Cells: Is the Glass Half Empty or Half Full?"
     - Primen Strategic Report dated September 26, 2002: "Will Demand Response Programs Drive the Market for Distributed Resources?"
     - Primen Strategic Report dated June 26, 2002: "The New Economic Landscape for DE."
     - Primen Perspective #15: "Is Small Profitable Today? An Energy Provider's Perspective."
     - Primen Perspective #16: "Residential Distributed Energy, Will It Expand Beyond the Standby Market?"
     - Primen Perspective #17: "Hanging Tough in a Soft Market."
     - Primen Perspective #18: "New Technology Automobiles – Road to Distributed Energy?"
     - Primen Strategic Report dated December 21, 2002: "Distributed Energy's Move to the Mid-Market Applications and Technologies in the 500 kW to 10 MW Range."

Project Status:
The project has been completed.